REMARKS

Claims 1-14 are presented for consideration, with Claims 1, 4, 7, 10, 13 and 14 being independent.

The independent claims have been amended to further distinguish Applicant's invention from the cited art.

Initially, Claims 1-14 remain rejected under 35 U.S.C. §112, first paragraph, as allegedly failing to comply with the written description requirement. In response, it is respectfully submitted that the claimed phrase "rate of existence" (e.g., Claim 1, lines 4 and 5) would be readily understood by one skilled in the art, based on common knowledge and, for example, the discussion on page 4, lines 6-16 of the specification. This phrase is also used, as one example, in Claims 1 and 8 of U.S. Patent No. 6,548,437, as further evidence of Applicant's position that such phrase is a term of art readily understood and used by those skilled in the art. Accordingly, reconsideration and withdrawal of the rejection of the claims under 35 U.S.C. §112, first paragraph, is respectfully requested.

Claims 1, 4, 7, 10, 13 and 14 stand rejected under 35 U.S.C. §112, second paragraph, as allegedly being incomplete. Without conceding to the propriety of this rejection, the claims have been amended to include a procedure (of updating the design variable vector) when the updates are not terminated. Accordingly, it is submitted that all the claims are in full compliance with the particularity and distinctness requirements of the statute, and therefore reconsideration and withdrawal of the rejection of the claims under 35 U.S.C. §112, second paragraph, is respectfully requested.

Claims 1, 2, 4, 5, 7, 8, 10, 11, 13 and 14 are rejected under 35 U.S.C. §103 as allegedly being obvious over the Patnaik publication in view of Adeli '394. In addition, Claims 3 and 9 are rejected as allegedly being obvious over those citations and further in view of the Lingen publication, and Claims 6 and 12 are rejected as allegedly being obvious over Patnaik, Adeli and further in view of the Dickinson publication. These rejections are respectfully traversed.

Claim 1 of Applicant's invention relates to a method of optimally designing a structure in an area comprising a step of obtaining a solution of a structure optimal designing problem having a first solution process to solve an optimization problem of a first evaluation function for a status variable vector and a design variable vector, wherein the design variable vector is a rate of existence to a structural member in each divided area of the area, and the status variable vector is a displacement in each node of the divided area. The first solution process includes a design variable update step of reading the design variable vector and the status variable vector stored in a first storage unit, updating the design variable vector, and storing the updated design variable vector into the first storage unit, and a status variable update step of reading the updated design variable vector and the status variable vector stored in a second storage unit, updating the status variable vector, and storing the updated status variable vector into the second storage unit. The status variable update step includes a second solution process to solve an optimization problem of a second evaluation function for the updated status variable vector and the updated design variable vector, wherein the second evaluation function corresponds to a norm of a residual vector which is obtained as a difference between a nodal

force vector and the updated status variable vector on which a global stiffness matrix is operated. Additional steps include a determination step of determining whether the update in the design variable update step and the update in the status variable update step are to be terminated, and an output step of outputting an image of the structure corresponding to the design variable vector and the status variable vector after the updates are terminated, and otherwise returning to the design variable update step to update the design variable vector.

In accordance with Applicant's claimed invention, high performance designing of a structure can be achieved.

The Patnaik publication relates to optimizing a procedure for automated structural design and is relied on in the Office Action for teaching, among other features of Claim 1, a first solution process comprised of a design variable update step and a status variable update step that includes a second solution process to solve an optimization problem of a second evaluation function for the status variable vector and the design variable vector. The Office Action acknowledges that Patnaik does not provide that the second evaluation function corresponds to a norm of a residual vector which is obtained as a difference between a nodal force vector and the status variable vector on which a global stiffness matrix is operated.

The secondary citation to Adeli was cited to compensate for the deficiencies in Patnaik. In Adeli, a computational model is provided for design automation and optimization. The Office Action contends that Adeli includes a second evaluation function that corresponds to a norm of a residual vector obtained as a difference between a nodal force vector and a status

variable vector on which a global stiffness matrix is operated, relying on equation 41 (column 18, line 9).

It is respectfully submitted, however, that it would not have been obvious to one skilled in the art to combine Patnaik and Adeli in the manner proposed in the Office Action. The Office Action relies on equation 27 in Patnaik (page 9) for supporting the second evaluation function. As understood, however, this equation is capable of calculating m displacement X, which correspond to a status variable vector, from n forces F, corresponding to a design variable vector. It is respectfully submitted, however, that the optimality criteria method used in Patnaik does not teach or suggest use of, among other criteria, a nodal force vector P, a global stiffness matrix X, and a nodal displacement vector u, as provided in equation 41 of Adeli. It is submitted, therefore, that Patnaik's method would be rendered inoperable if such an equation was used in the manner proposed in the Office Action. Accordingly, it is submitted that only through impermissible hindsight would one skilled in the art have combined Patnaik and Adeli in the manner proposed in the Office Action.

It is submitted, therefore, that Claim 1 is patentable over the proposed combination of art.

Claim 4 relates to a method of optimally designing a structure and includes, among other features, a first solution process and a second solution process to solve an optimization problem of a second evaluation function for the updated status variable vector and the updated design variable vector, wherein the second evaluation function corresponds to a norm of a residual vector which is obtained as a difference between nodal force vector and the

updated status variable vector on which a global stiffness matrix is operated, as set forth in Claim 1. The second solution processing in Claim 4 also includes a conjugate radiant method and includes a preconditioning step of executing preconditioning on a nodal force vector based on a global stiffness matrix. Claims 7 and 13 relate to an information processing apparatus and a program stored in a computer readable storage medium, respectively, and correspond to Claim 1. Claims 10 and 14 relate to an information processing apparatus and a program stored in a computer readable storage medium, respectively, and correspond to Claim 4. These claims are thus also submitted to be patentable for at least the reasons discussed above.

Therefore, reconsideration and withdrawal of the rejection of Claims 1, 2, 4, 5, 7, 8, 10, 11, 13 and 14 under 35 U.S.C. §103 is respectfully requested.

The tertiary citation to Lingen relates to a system having an iterative algorithm to solve non-symmetric systems of equations and was cited for its teaching of a conjugate residual (GCR) method.

The tertiary citation to Dickinson relates to conjugate gradient methods for three-dimensional linear elasticity and is relied on for its teaching of sending a nodal force vector to zero (0) in a preconditioning step.

Both tertiary citations, however, fail to compensate for the deficiencies in the proposed combination of Patnaik and Adeli as discussed above. Therefore, without conceding to the proposed combination of Patnaik and Adeli with either Lingen or Dickinson, such combinations still fail to teach or suggest Applicant's claimed invention. Accordingly,

reconsideration and withdrawal of the rejections of Claims 3, 6, 9 and 12 under 35 U.S.C. §103 is respectfully requested.

Thus, it is submitted that Applicant's invention as set forth in independent Claims 1, 4, 7, 10, 13 and 14 is patentable over the cited art. In addition, dependent Claims 2, 3, 5, 6, 8, 9, 11 and 12 set forth additional features of Applicant's invention. Independent consideration of the dependent claims is respectfully requested.

In view of the foregoing, reconsideration and allowance of this application is deemed to be in order and such action is respectfully requested.

Applicant's undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,

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